

Modeling Coronavirus

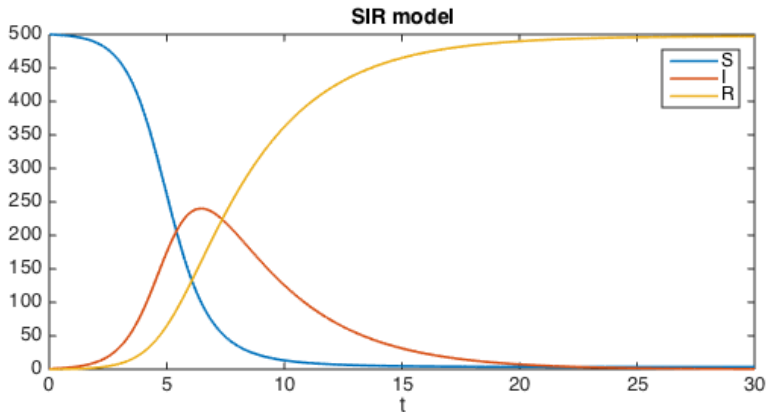
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DRP 2020

June 8, 2020

SIR Overview

Number of **S**usceptible, **I**nfected, and **R**ecovered individuals in a population



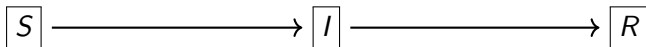
SIR Overview

Equations:

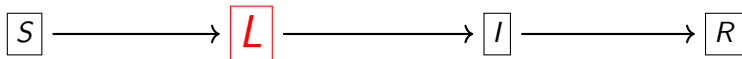
- $\frac{dS}{dt} = -\beta \frac{SI}{N}$
- $\frac{dI}{dt} = \beta \frac{SI}{N} - \gamma I$
- $\frac{dR}{dt} = \gamma I$

β is the contact rate * probability of transmission given contact

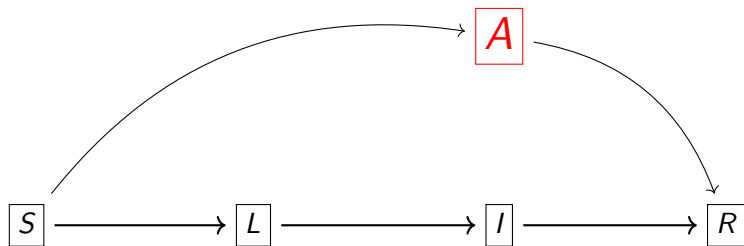
SIR Overview



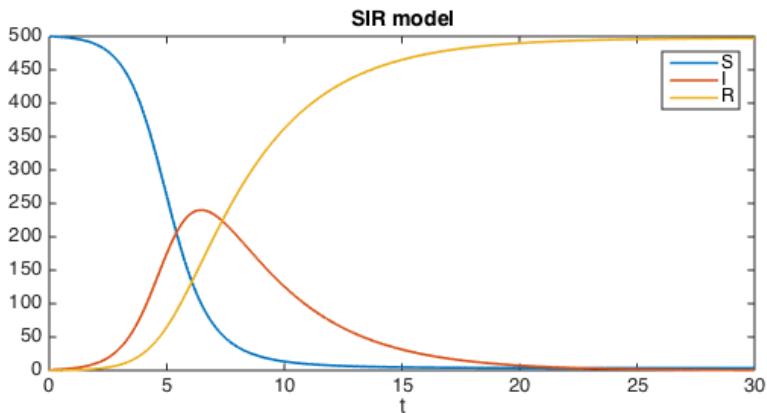
Our Model: Latent Period



Our Model: Asymptomatic Individuals



Revisiting the Infected Curve



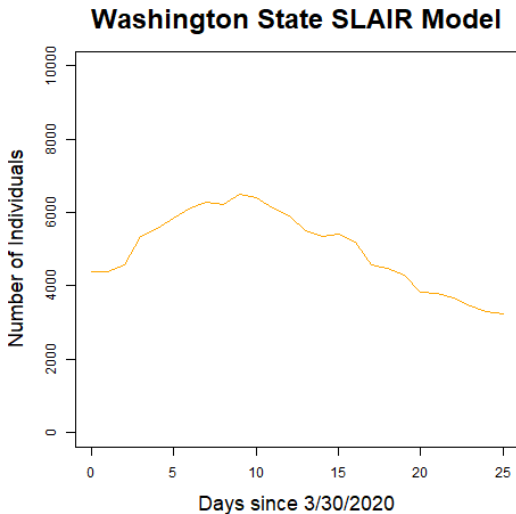
$$\frac{dI}{dt} = \beta \frac{SI}{N} - \gamma I$$

Finding Unknown Parameters: Goal

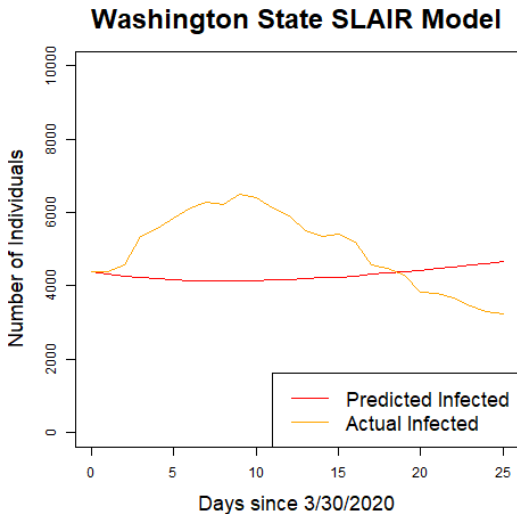
Goal:

Find values of unknown parameters that would best fit the actual WA State data **during social distancing**

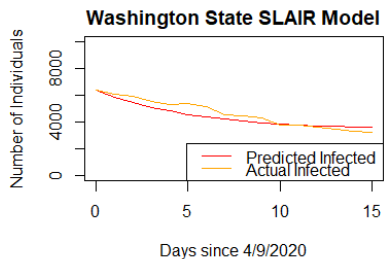
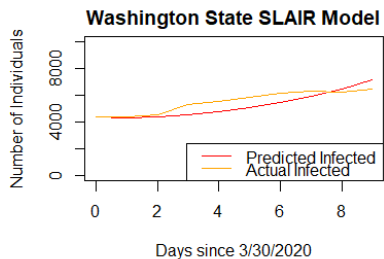
Finding Unknown Parameters: Complications



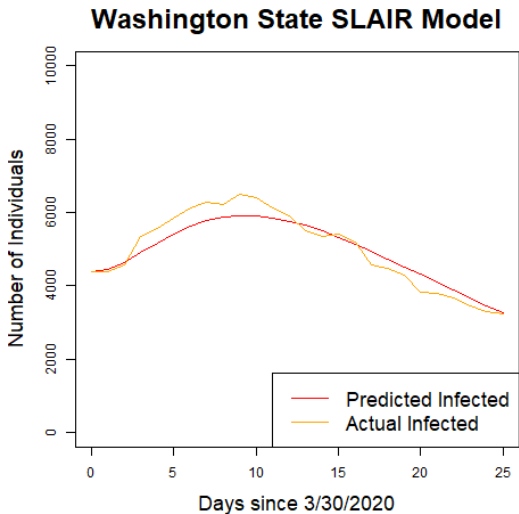
Finding Unknown Parameters: Complications



Potential Solution 1



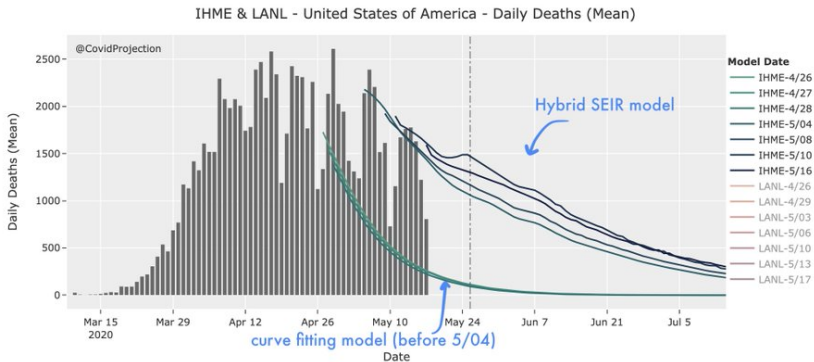
Potential Solution 2



Why use a model at all?

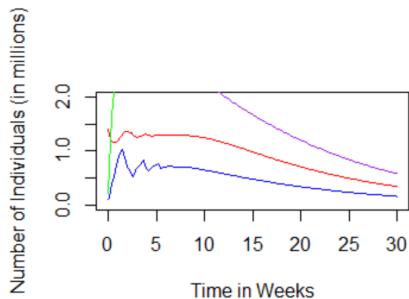
Why use a model at all? Why not just use curve fitting?

- A well-fit curve does not necessarily give an accurate prediction
- Models provide an epidemiological explanation

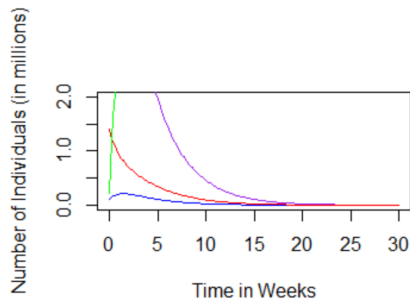


Effect of Social Distancing

Turn on/off social distancing based on threshold (I/S)



(c) 13/3282



(d) 1/1000000

(red = infected)

Thank you!

Questions?